18 November 1997

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

Written on 12 June 1997
Received on 04 August 1997

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GENERAL COMMENTS

The draft work plan is generally well written. Some additional justification is required, however, for several proposals.

SPECIFIC COMMENTS

Comment 1: Compliance with the storm water benchmarks utilized in earlier studies (Section 2.2.1, page 2-4 and Table C-2) should not be construed that there is no potential ecological hazard associated with these outfalls. For example, the benchmarks listed in Table C-2 for anthracene, arsenic, copper, lead, mercury, nickel, silver and zinc exceed the marine acute or chronic Ambient Water Quality Criteria (AWQC) and thus would present a toxic hazard to aquatic receptors.

Response 1: The results from the stormwater monitoring were presented as discussed in the Law/Crandall 1995-1996 Storm-Water Monitoring Report. No additional interpretation was provided in this Work Plan and the benchmarks identified in the Law/Crandall report are not being used for the RI investigation. The sentence in the second paragraph on page 2-4 that states "Analytical results below the benchmark are deemed to be insignificant" will be changed so it is not implied that there is no risk to ecological receptors.

Water samples collected during the RI field activities will be evaluated in context of the Numerical Water Quality Objectives for human health and marine aquatic life protection. Evaluations with these objectives will be for descriptive purposes only and will not factor into screening or decision matrices.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

Comment 2: It appears from the Conceptual Exposure Model (Figure 3-2, page 3-5) that anglers and bathers are purposefully consuming San Diego Bay water. The intention might be more clear if the row label for humans were "incidental ingestion" with a separate row label of "ingestion" for ecological receptors.	**Response 2:** A row label of "Incidental ingestion" will be added to Figure 3-2, page 3-5 for human receptors and surface water.
Comment 3: It would be helpful to include some discussion of the assessment endpoints and the proposed measurement endpoints prior to presentation of the conceptual exposure model (Figure 3-2, page 3-5). The avian species which are proposed as surrogates for some of the species listed in the figure are not discussed until much later in the document.	**Response 3:** Comment noted. A new discussion will be added to Section 3.1 to describe the conceptual exposure model as well as the proposed assessment and measurement endpoints. This will serve to clarify the intent of the work plan.
Comment 4: We agree that fish tissue sampling is an important part of the human health risk assessment (Section 3.7.1.1, page 3-21) and that fish may move daily, tidally or seasonally through the NTC San Diego boat channel. We propose that the three strata be sampled by otter trawl, as proposed, but that the samples from each strata be taken separately and compared on board the sampling vessel to determine whether there is a discernible difference in the species collected. If there is no difference in species composition among the strata, using fish from the entire boat channel is appropriate as proposed (Section 3.7.1.1, page 3-21). Otherwise, the fish samples from each strata should be analyzed separately.	**Response 4:** This issue was discussed at length during an interagency meeting held on 24 June 1997. It was decided at that meeting that, due to physical and safety constraints such as pylons and submerged debris, trawling may not be possible in each of the three strata. This is especially true in Stratum 1 where, in approximately 20 feet of water, a boat is submerged near the middle of the stratum. Therefore, it was agreed that trawls will be run from the middle section of Stratum 2 northward into Stratum 1. This will constitute the trawling effort within the channel. It was also agreed at the 24 June 1997 meeting that beach seines will be used to sample shallow water areas near eelgrass beds. The seines will target fishes with smaller home ranges and species that are in closer contact with the sediment, such as sculpins or gobies. Whole-body tissue analyses will be conducted on one of these fish species collected by this method, and the tissue chemistry results will be used strictly for ecological risk assessment purposes. Trawling or passive capture methods (e.g., stationary nets) will not be conducted in the reference area due to hazards and boat traffic. Fish tissue data collected for the San Diego Bay Health Risk Study (San Diego County Department of Health Services 1990) will be used to describe fish tissue concentrations outside of the Boat Channel and associated risks to human health on a regional level.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

	Spotted sand bass, white croaker, and spotted turbot (in order of preference) have been selected as potential benthic fish species to be collected for use in the human-health risk assessment. These species have also been selected as potential benthic fish species to be collected for modeling food-chain effects on piscivorous receptors such as herons and harbor seals. Topsmelt, jacksmelt, and Northern anchovy have been selected as potential fish species to be collected for modeling food-chain effects to a piscivorous receptor such as the least tern.
Comment 5: On the whole, we agree with the bioassay evaluation criteria (Section 3.7.2.1, page 3-23). However, DTSC may consider a bioassay difference between the treatment and control which is not statistically significant as biologically significant dependent on the response in the control and the variance in the replicate bioassays. A similar comment has been made on previous aquatic ecological risk assessments performed by Bechtel in San Diego Bay but to date has not been a cause for discussion.	**Response 5:** Comment noted.
Comment 6: The sampling buckets in which sediments will be deposited for transport to the laboratory (Section 4.2.1, page 4-2 and Section 3.2.1, page A3-2) must be tightly sealed in some manner during transport. Please include a description of the method for sealing the sample buckets.	**Response 6:** The sediment will be transferred from the grab sampler into 5-gallon plastic buckets with snap-on lids. The lids will be taped closed, and sample labels and custody seals will be applied. All samples will be transported under full chain-of-custody protocol. Page 4-2 of the Work Plan and page A3-2 of the Field Sampling Plan (FSP) will be revised to indicate this procedure.
Comment 7: We concur that the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends (NS&T) chemistry protocols for polycyclic aromatic hydrocarbons (PAHs) and congener-specific polychlorinated biphenyls (Section 5.1, page 5-1) are adequate for these studies.	**Response 7:** Comment noted.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

Comment 8: We agree that fish tissue collected from the NTC San Diego boat channel is more descriptive than necessarily reflective of contaminant distribution within the boat channel itself (Section 6.2.1, page 6-3). Risk communication, in addition to remedial alternative selection, is one of the purposes of a Remedial Investigation (RI) human health risk assessment under the Comprehensive Environmental Restoration, Compensation and Liability Act (CERCLA). There are studies which document subsistence fishing in San Diego Bay (San Diego County Department of Health Services, 1990). It is therefore appropriate that the incremental risk and hazard associated with consumption of fish and shellfish caught or collected in the NTC San Diego boat channel be quantified. This should not be construed to mean that HERD would recommend extensive or expensive remediation of the boat channel should consumption of fish or shellfish elevate the incremental cancer risk above the *de minimis* level.	**Response 8:** Comment noted.
Comment 9: Fish samples for the human health risk assessment (Section 2.3, page A2-2) for subsistence fishers (Attachment F) should be based on the available survey of San Diego subsistence fishers (San Diego County Health Department, 1990). A copy of the exposure assessment section of this report is attached. Whole fish or whole fish with internal organs removed should be used for this group. Skinless fish fillets appear appropriate for the recreational fisher scenario.	**Response 9:** Comment noted. The San Diego Health Department (1990) survey will be reviewed. Table 2-1, page A2-5, will be modified to indicate that whole fish as well as skinless fillets will be subjected to chemical analysis for use in human-health risk calculations for subsistence and recreational anglers, respectively.
Comment 10: Please include references to the Long and Morgan (1990) publication (Section 3.2.2, page C3-5) in the Quality Assurance Project Plan for the antimony Effects Range-Low (ER-L) and Effects Range-Median (ER-M). The antimony ER-L and ER-M are listed in Table 3-4.	**Response 10:** Comment noted. The Long and Morgan (1990) reference will be added to the Quality Assurance Project Plan (QAPP) reference list.
Comment 11: Table 3-4 fails to list the ER-L and ER-M values for DDT and several other pesticides (Table 3-4, page C3-9). Please include the appropriate ER-L and ER-M values in the table, they are currently indicated as "Not Available."	**Response 11:** The appropriate ERL and ERM values will be added for DDT and the other pesticides where available.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

Comment 12: The Target Method Reporting Limits for individual polychlorinated biphenyl (PCB) congeners in sediment and tissue on a wet weight basis are reported as 0.5 mg/kg (Table 3-4, page C3-9). The National Oceanic and Atmospheric Administration (NOAA) National Status and Trends (NS&T) analytical methodology for PCB congeners should be employed in the NTC San Diego boat channel investigation.	**Response 12**: Comment noted. The units listed on Table 3-4 for pesticides, PCBs, and semivolatile organic compounds (SVOCs) are incorrect. The table will be revised to indicate units of micrograms per kilogram (µg/kg) for these analytes. As indicated on Table 3-4, the NOAA National Status and Trends methods will be utilized for PCBs and SVOCs.
Comment 13: With one exception, we agree with the exposure pathways proposed for each exposure scenario (Table 2-1, page F2-5). It seems unreasonable to propose that individuals engaged in general beach activities are exposed via inhalation of airborne vapors and particulates while individuals engaged in fishing are not exposure via these routes. The atmosphere is the atmosphere. These two pathways should be added to the fishing scenario.	**Response 13:** Comment noted. The inhalation pathway (particulates and vapors) will be added to the fishing scenario.
Comment 14: A conversion factor of ml/cm^3 is listed in the dermal contact with water formula (Section 2.2.5, page F2-8). There would not appear to be any need for such a conversion factor as 1 ml of water is equivalent to 1 cm^3 of water within the error inherent in a human health risk assessment.	**Response 14:** Comment noted. CF_2 will be removed from the equation.
Comment 15: Perform a particle size analysis of the beach sand samples that will be collected so that a default particle size is not necessary (Section 2.2.6, page F2-9).	**Response 15:** We plan to perform particle-size analyses to estimate the aggregate size distribution mode of the beach sand and the percentage of the respirable fraction. The former will employ sieves, and the latter will use a sedimentation technique. The information will be used to reestimate UT and Fx. Although UT and Fx in the particulate emission factor (PEF) equation are dependent on particle size, the values shown in the Work Plan for UT and Fx are not default particle sizes. UT is the threshold friction velocity of wind 7 meters above the ground surface. It is the velocity that must be reached to cause erosion. Because the erodability of soil particles decreases with particle size, UT increases with particle size. How the U.S. EPA default value of 11.32 meters per second (m/s) was derived is not clear, but based on a nomogram developed by Gillette (1980 J.Geophys. Res. 85:5621), it is appropriate for particles with an aggregate size distribution mode less than 0.1 millimeter (mm) (0.04 to 0.06 mm). Fx is dependent on particle size because it is a function of UT.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

	Our observations indicate that the beach sand at the Boat Basin is coarse and that it is unlikely that particle-size measurements will cause a reduction in UT. The default UT value is higher than the mean annual wind speed for all directions at Lindbergh Field in San Diego where the mean speeds for different directions have not exceeded 9.9 m/s. This suggests that the velocity of the wind in the area is not high enough to cause sustained erosion of the beach sand. The above was not discussed in the teleconference of 09 July 1997. Instead, the discussion focused on respirable particles. It was agreed that beach samples would be analyzed for percentage of particles in the respirable range (10 microns or less). This may produce a better estimate of the atmospheric concentration of particulate contaminants. Such an estimate is derived by multiplying the computed concentration of a contaminant in air by the percentage of respirable particles in air. Because the PEF value in the dose equation represents total airborne particles, this process is appropriate. Because risk is directly proportional to contaminant concentration, the adjustment would be best made by applying the percentage to the risk value.
Comment 16: A subset of the sediment and beach sand samples should be analyzed for chromium VI so that the incremental cancer risk associated with chromium VI can be definitively evaluated (Section 2.3, page F2-11). Chromium VI should be added to the list of potential contaminants which will be evaluated using Cal-EPA cancer slope factors.	**Response 16:** Comment noted. The RI Work Plan will be revised to indicate that the beach sand samples will be analyzed for hexavalent chromium. The Navy does not concur with the recommendation for additional hexavalent chromium analyses of sediment samples. Under reducing conditions as defined by the presence of organic carbon, S^{2-}, Fe^{2+}, or acidic soil conditions , hexavalent chromium cannot exist and is rapidly reduced to insoluble Cr (III). Accordingly, when such samples are subjected to laboratory analysis and spiked with Cr (VI) for quality control purposes, the strong reducing nature of the sample reduces the Cr (VI) spike to an insoluble form of Cr (III). Unfortunately, the 0 percent spike recoveries observed are interpreted in the conventional manner and determined to represent a method failure. These conditions would suggest that additional analyses of the sediment samples for Cr (VI) would be rejected during the data validation process.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

	During the Sediment Characterization of the Boat Channel, total organic carbon was reported at concentrations ranging from 3,740 to 21,500 mg/kg in shallow sediment samples from Strata 1 and 2, and sulfide was present in shallow sediment from all three strata in concentrations ranging from nondetect to 370 mg/kg. In addition, hexavalent chromium was reported in 2 of 9 shallow sediment samples at concentrations of 0.005 mg/kg. All other results were nondetect and subsequently were rejected during the validation process due to 0 percent spike recovery. Additional references R.J. Vitale, G.R. Mussoline, J.C. Petura, and B.R. James. 1995. Hexavalent chromium quantification in soils: An effective and reliable procedure. *American Environmental Laboratory*. April. R.J. Vitale, G.R. Mussoline, J.C. Petura, and B.R. James. 1994. Hexavalent chromium extraction from soils: Evaluation of an alkaline digestion method. *Journal of Environmental Quality 23:1249-1256. December.*
Comment 17: Lead is now classified as a carcinogen (Section 2.4.3, page F2-12) by the State of California Air Resources Board and should be evaluated based on carcinogenic as well as noncarcinogenic effects. The provisional oral cancer slope factor is 8.5×10^{-3} $(mg/kg\text{-}day)^{-1}$ and the provisional inhalation cancer slope factor is 4.25×10^{-2} $(mg/kg\text{-}day)^{-1}$. The provisional inhalation unit risk is 1.2×10^{-4} $(g/m^3)^{-1}$.	**Response 17:** Thank you for informing us that Cal-EPA has developed a oral and inhalation CSFs for lead. We will evaluate lead as a carcinogen and a noncarcinogen.
Comment 18: Please amend the reference to the draft DTSC guidance on ecological risk assessment (Section 3.2, page F3-2) to reflect the issuance of the final guidance in July 1996.	**Response 18:** Comment noted. The reference will be amended.
Comment 19: Please provide additional justification for proposing the kingfisher as a surrogate for the California least tern and the California brown Pelican (Section 3.5.3.9, page F3-14). As the predictive ecological risk assessment relies on calculated intakes there would appear to be no reason to exclude the California least tern and the California brown Pelican. Use the California least tern and the California brown Pelican rather than the kingfisher.	**Response 19:** The great blue heron, brown pelican, and least tern will be used as receptors for the ecological risk assessment in place of the belted kingfisher.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from James M. Polisini

Comment 20: Please submit the proposed exposure parameters of the ecological risk assessment representative species prior to initiation of the predictive risk assessment calculations (Section 3.6.2, page F3-17).	**Response 20:** Comment noted. The proposed exposure parameters of the ecological risk assessment representative species will be submitted prior to initiation of the predictive risk assessment calculations.
Comment 21: The description of benchmarks developed by Opresko, et al. (1995) (Section 3.7, page F3-17) makes it unclear what approach will be followed for vertebrate representative species. Benchmarks are typically expressed in terms of a concentration in one or several environmental media. The predictive ecological risk assessment for vertebrate representative species at NTC San Diego boat channel should employ the comparison of total intake in mg/kg/day to No Observable Adverse Effect Levels (NOAELs) in mg/kg/day.	**Response 21:** The calculation of hazard quotients for vertebrate receptors (harbor seal, great blue heron, brown pelican, and least tern) will be based on exposure (ingestion, inhalation/respiration, dermal) to affected media (sediment, water, and fish). The total exposure for each chemical will be calculated as an intake value of mg/kg body weight/day. The toxicity reference value used to calculate the hazard quotient will be a NOAEL derived from an appropriate test organism, such as those values contained in Opresko et al. (1995). NOAELs will be adjusted where necessary to account for body weight differences according to the methods explained in Opresko et al. (1995). If a NOAEL is unavailable, a lowest-observed-adverse-effects level (LOAEL) may be used with adjustments according to the methods explained in Opresko et al. (1995). NOAELs and LOAELs will have intraclass uncertainty factors applied, if necessary, according to DTSC guidance.
Comment 22: Intra-class uncertainty factors (UFs) must be applied to utilize terrestrial mammalian wildlife toxicity reference doses (RfDs) for harbor seals (Section 3.7, page F3-17). DTSC ecological risk assessment guidance contains a list of default intra-class UFs for mammals which should be used in this ecological risk assessment.	**Response 22:** Comment noted (see response to Comment 21).
CONCLUSIONS:	
In general, the draft work plan for the second phase of investigation of the NTC San Diego boat channel is well conceived and well written. Once the specific comments are addressed the studies outlined in this draft work plan should supply information sufficient to evaluate the potential ecological hazard and human health risk and hazard associated with boat channel sediments and water.	Comment noted and appreciated.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Michael J. Wade

Written on 13 June 1997
Received on 04 August 1997

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GENERAL COMMENTS

Comment 1: Chemistry Data and Quality Assurance: We assume any sampling of environmental media, analytical chemistry data, and quality assurance procedures described and summarized in the Navy document were adequately reviewed by Office of Military Facilities (OMF) regional staff. If deficiencies or data gaps were encountered with respect to adequacy for risk assessment, these are noted in our comments.	**Response 1:** Comment noted. The Navy CLEAN program Standard Operating Procedures (SOPs) have been reviewed by DTSC and U.S. EPA. Controlled copies of the SOPs are with Ms. Sherrill Beard of DTSC and Ms. Bonnie Arthur of U.S. EPA.
Comment 2: Editorial Aspects: The document was reviewed for scientific content. In general, minor grammatical or typographical errors that do not affect the interpretation have not been noted. However, these should be corrected in the final version of the document.	**Response 2:** Comment noted. Grammatical and typographical errors will be corrected in the final version of the Work Plan.
Comment 3: Document Revisions: Future changes in the document should be clearly identified. This may be done in several ways: by submitting revised pages with the reason for the changes noted; by the use of strikeout and underline; by the use of shading and italics; or by cover letter stating how each of the comments here have been addressed.	**Response 3:** Comment noted. Changes to the draft Work Plan resulting from the regulatory comments are addressed within this Response to Comments document.

SPECIFIC COMMENTS

Comment 1: Table 2-6, (Page 2-13): Beryllium is ordinarily analyzed as part of the suite of metals. Bechtel should explain why it was not analyzed.	**Response 1:** Table 2-6 reports the results of the Bay Protection Toxic Cleanup Program. The analytes were selected by the California State Water Resources Control Board (SWRCB) and NOAA for the purposes of their study. Sediment samples were analyzed for beryllium during the sediment characterization of the Boat Channel (BNI 1996), and as indicated in the RI Work Plan (see Table 3-1, page 3-8), beryllium is included in the list of analytes for the remedial investigation.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Michael J. Wade

Comment 2: Figure 3-2 (Page 3-5): We note that fish, but not shellfish, are included as an exposure route for humans in the conceptual exposure model for the boat channel. We also note in Table 2-12, that significant levels of pesticides and PCBs were found in clam tissue harvested from the boat channel. Shellfish should be included as an exposure source for humans or information should be provided which indicates that shellfish are not harvested from the boat channel for human consumption.	**Response 2:** Because the Boat Channel has been surrounded by military property, there has been little to no public access to the channel shoreline. Thus, shellfish harvesting by the public has not been observed along the channel. Additionally, the habitat suitability for shellfish along the Boat Channel beach shoreline appears to be marginal due to the configuration of the channel, with long, narrow expanses of rip-rap interspersed with narrow beach/mudflats.
Comment 3: Page 3-22: Please note that some ethnic groups consume more than just fillets. Fish samples should be analyzed according to the patterns of fish preparation and consumption practiced by persons fishing in the Boat Channel.	**Response 3:** The doses to recreational and subsistence fish consumers will be based on consumption of fillets and whole fish. This approach was also used in the assessment of the West Basin of Long Beach Harbor. The RI Work Plan will be revised to state this approach.
Comment 4: Page 3-5: Dioxins are not listed as potential analytes. Are chlorinated dioxins and furans liable to [be] present in sediment or fish samples.	**Response 4:** There are no known industrial sources of dioxins and furans on NTC, which was confirmed by representatives from DTSC who work with other Installation Restoration Program (IRP) sites on NTC. Therefore, it is not likely that chlorinated dioxins and furans will be present in sediment or fish samples from this site.
Comment 5: Page 3-5, last paragraph: The EPA has published extensive guidance on risk assessment of contaminants in fish consumed by recreational anglers. References on this topic are provided at the end of this memo.	**Response 5:** Comment noted.
Comment 6: Page F4-1: The Department's Preliminary Endangerment Assessment Manual (see listing under Department of Toxic Substances Control 1994a) should be cited and utilized as a reference. It provides information on calculation of risk and hazard via the dermal exposure pathway.	**Response 6:** Comment noted. The Preliminary Endangerment Assessment (PEA) Manual will be used and referenced.
CONCLUSIONS:	
In general, the work plan is well written and comprehensive. Our comments as listed above should be addressed/incorporated in the next iteration of the work plan.	

18 November 1997

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Received on 4 August 1997

Clarence A. Callahan, Ph.D.
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GENERAL COMMENTS

The document is well written, with techniques that are acceptable, and results that clearly show that there is an impact in certain areas to certain receptors. The proposed approach, however, misses the mark for the phase of this project. With the preliminary assessment already completed and the available data from other studies, the Navy has established that there is a toxicity problem and a bioaccumulation problem in the Boat Channel. The phase to be addressed now is that of establishing the exposure of site specific contaminants and the response of site specific receptors in order to delineate the actual risk for the Boat Channel. Contaminant levels that pose a significant risk based on bioassays must be delineated as a distribution for the site for those receptors that are known to inhabit the site. The next effort should be the "Impact Assessment" phase where the goal is to describe "how much contamination" produces "what level of response" as described in an exposure - response relationship.

SPECIFIC COMMENTS

Comment 1: Page 2-4, The appendix that is referenced for having the "benchmarks" that are used in the 1995-1996 Storm-Water Monitoring Report (Law/Crandall 1996) cannot be found. Please provide the benchmarks and the report by Law/Crandall, 1996.

Response 1: The appendix is located immediately following Section 7. The last page of footnotes in the appendix was missing from the draft Work Plan. This page will be added to the appendix in the final version of the Work Plan. The Law/Crandall (1996) Storm-Water Monitoring Report will be available under separate cover for U.S. EPA review.

Comment 2: Page 2-24, Total sulfide measurements are essentially unusable because of the lack of recovery for the matrix spike.

Response 2: Comment noted. Spike recovery was poor for total sulfide measurements in sediment samples analyzed for the Sediment Characterization Report of the Boat Channel.

The PAH and PCB results should be reported in this document.

Two new tables summarizing the polynuclear aromatic hydrocarbon (PAH) and PCB results from the sediment characterization of the Boat Channel will be included in the final RI Work Plan.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 3: Page 2-39, Results of Clam Tissue Analyses. The shading that designates the concentrations that exceeded both the baseline and control concentrations does not show clearly in the copy provided for review. There are several contaminants that are above the baseline and control. The results show that all three strata are very close to the same levels of bioaccumulative levels for clams. The metals were essentially the same with some being higher in Stratum 3 (chromium, manganese, vanadium, zinc, and tributyl tin) while Strata 1 and 2 were higher for other metals (lead and selenium).	**Response 3:** Comment noted. Boldface type will be used in the final RI Work Plan to designate concentrations exceeding baseline and control in Table 2-12.
All strata seem to have close to the same levels of contamination for the high molecular weight PAHs. The pesticides were generally higher for Strata 1 and 2. The PCBs, when present, were approximately equally distributed among the three strata.	Comment noted.
The chemical distribution seems to reflect the results of the Law/Crandall (1996) report that showed the general lack of circulation and influence from outside the boat channel (see page 1-4).	Comment noted.
Comment 4: Page 2-43, Table 2-13, Summary of Sediment Bioassay Test Results. These results appear to show that the stations S1S1, S1S2 and S1S3 are impacted the most. Amphipod survival is lowest for these stations, all being below 84% while the others are all above 86%. S1S1 was shown to be consistently with the highest impact; the control showed the least amount of impact for all measurements. For the polychaete survival, the bivalve larvae development and the echinoderm larvae development sample S1S1 was the most impacted, while the amphipod reburial and the polychaete growth did not show the highest level of impact. Polychaete survival did not show any difference among the samples as all showed 100 percent survival.	**Response 4:** Comment noted.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

It appears that most of the higher contamination levels for metals (Table 2-9), pesticides (Table 2-11) were observed in the 0-1 ft sediment sample. It also appears that bioaccumulation for metals, tins, HPAHs, pesticides, and PCBs is significant in the clam data (Table 2-12) in all three strata, although a little lower in stratum 3. It is not surprising that the polychaete survival (Table 2-13) did not indicate any differences because this test is not a very sensitive test for mortality. The growth data for the same species shows some range in the data, not much explanation is provided for interpretation, consequently these data do not indicate any relationship to contamination. The echinoderm development test and the bivalve larvae development test both indicated that the same samples were the most toxic and the second most toxic in rank, however, after these two samples a slight trend is evident, but not much is similar (Table 2-3). Questions to be addressed: 1. What are the primary contaminants that could have contributed to the high mortality in stratum 1? 2. What are primary contaminants that should be further evaluated to define the exposure - response relationship for the contaminants and receptors in the Boat Channel? 3. What procedures i.e., bioassays will best define the delineation of the significant responses that indicate significant environmental risk?	It is agreed that these are important questions that are to be addressed in this remedial investigation and are noted. In response to the first two questions, the primary contaminants that may contribute to the high amphipod mortality observed in Stratum 1 will be identified through the collection of sediment at multiple sampling stations. Based on historical bioassay performance in Stratum 1, it is expected that the bioassay results conducted in the first tier of testing at these stations will trigger further chemical analyses. The sediment chemistry data will be evaluated against published effects ranges (e.g., ERL, ERM, threshold exposure limit, permissible exposure limit) to assess whether the observed effects are within the predicted range of effects for the contaminants measured. It is likely that a pattern of chemical distribution and toxicity will be observed, with a suite of contaminants that are shown to exceed these effects range values associated with elevated toxicity. This group (or groups) of contaminants would then be the likely candidates for further definition of exposure-response relationships of receptors in the Boat Channel.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

	In regard to the third question, the use of solid-phase and porewater bioassays, with recognized sensitivity to sediment contamination, will be used in the evaluation of significant risk to ecological receptors. The target receptors, benthic invertebrates, are important to assess because they are directly exposed to the sediment and are potential prey items for organisms higher in the food chain. The selected bioassay species, the amphipod, *Rhepoxynius abronius*, and the purple sea urchin, *Strongylocentrotus purpuratus*, used in the solid-phase survival and porewater developmental (or fertilization) tests, respectively, have been used extensively in the San Diego Bay region. Utilization of these test species is intended to evaluate both acute and chronic effects exhibited by benthic invertebrates due to exposure to contaminated sediments.
Comment 5: Page 3-2, Identification of decisions. From the results presented in this document (Table 2-9, Table 2-11, Table 2-12, and Table 2-13) there are significant impacts to the Boat Channel sediments. The primary decision question should be changed to: "What is the level of contamination observed in the boat channel that presents a significant risk to the environment?" A closely related question is, "What is the distribution of the significant concentrations of the contaminants that result in a significant impact to the environment?"	**Response 5:** Comment noted. The primary decision questions as suggested by U.S. EPA are more appropriate than that presented in the preliminary draft Work Plan. The decision question(s) on page 3-2 have been modified to incorporate this comment.
Comment 6: Page 3-2, Identification of Decision Inputs. Decisions should be made on the results of bioassays and associate chemistry that describe the contaminant distribution in the boat channel. The proposed use of bioassays should be for the establishment of the exposure - response relationship for the samples taken from the Boat Channel. Chemical analysis (for those contaminants that are suspected to have produced the mortality in the previous samples) of the samples should be extensive enough to establish the exposure - response relationship.	**Response 6:** Comment noted. The results from chemical and biological analyses of field-collected samples will be used to describe contaminant distribution in the Boat Channel, as stated in the Work Plan. However, to expand on the uses of the RI data, the listing of decision inputs will be modified and the text clarified.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 7: Page 3-7, Decision Rules. Where are the "background" stations located? Is this a statistical difference or a biological difference?	**Response 7:** Comment noted. The "background" stations mentioned on page 3-7 were incorrectly designated; the stations should be identified as "reference stations." This has been corrected in the Work Plan. The designation of the locations as reference stations is based on their distance from the NTC Boat Channel and associated outfalls, survival in amphipod and polychaete bioassays (greater than 80 percent), and sediment chemistry (lower than ERMs). The screening criteria for bioassay performance and sediment chemistry are the same as those used in the NAS North Island RI conducted for Site 1 Shoreline Sediments (SWDIV 1997). In fact, surface sediment chemistry measured at the Stratum 3 stations revealed that all of the constituents, except one, were below their ERLs. Only one constituent was slightly higher than its established ERL value (total DDT at Station S3S2, 1.58 µg/kg ERL versus 1.9 µg/kg measured concentration). This screening by ERLs is highly conservative.
Table 3-1, Why would all of these chemicals be carried through the assessment when not all of them appear to be involved in producing the results? None of the LPAH contaminants appeared in the tissue samples for clam bioaccumulation (Table 2-12). None of the SVOCs were found in these tissue samples and the detection limits shown in Table 3.1 are not sufficient to suggest any improvement over the first effort.	Reducing the number of analytes included on the chemical analysis list was discussed during an interagency meeting held on 24 June 1997. DTSC was strongly against decreasing the analyte list. Various meeting participants also pointed out that new stations in the Boat Channel would be sampled that do not have historical information regarding physical, chemical, or biological characteristics. It was therefore decided at the meeting that the analyte list will not be shortened so that possible contaminants would not be overlooked.
Comment 8: Page 3-16, If the bioassay tests do not meet the performance criteria, the bioassays must be rerun.	**Response 8:** Comment noted. As agreed during the interagency meeting held on 24 June 1997, the RI Work Plan will be modified to indicate that bioassay tests will be conducted again if performance criteria are not met.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 9: Page 3-18, Sample sites S3S1, S3S2, and S3S3 are not appropriate "reference sites" as the chemical contamination appears to be lower than the ER-L, a fairly conservative benchmark, they show significant bioaccumulation in clam tissues and S3S2 and S3S3 showed a significant reduction in echinoderm development. Also, S3S3 was fourth in rank for amphipod mortality. This strata seems to be a continuation of the trend from the Boat Channel rather than a true reference location.	**Response 9:** The selection of reference stations within Stratum 3 was based on screening criteria used for the remedial investigation conducted for the offshore sediments at NAS North Island. Based on the screening criteria used in that investigation, all three Stratum 3 stations would be judged as adequate to be considered reference sites. The sediment screening criterion specified that sediment concentrations must be less than ERM values. For constituents measured at the Stratum 3 stations, only one constituent exceeded its ERL value, the more conservative and protective guideline. The one constituent, total DDT at Station S3S1 was measured at 1.9 parts per billion (ppb), which is above its ERL value of 1.58 ppb but well below its ERM of 46.1 ppb. All other constituents measured at the Stratum 3 stations were below their respective ERL values. The bioassay screening criterion of greater than 75 percent survival in the polychaete and amphipod tests was met by all the Stratum 3 stations. Polychaete survival was 100 percent, and amphipod survival ranged from 86 to 91 percent. We are aware that survival in samples from Station S3S3 was ranked fourth lowest among the nine stations sampled for the Boat Channel sediment study; however, amphipod survival was 86 percent, which is greater than the screening criterion of 75 percent. It is recognized that percent normal larval development in sea urchin at Station S3S3 was very low (14.4 percent) and reportedly low at Station S3S2 (19.0 percent). However, for Station S3S2, we have found that percent normal development at Station S3S2 to be 71.9 percent, not 19.0 percent as reported in the Toxscan bioassay report (Toxscan 1996), and subsequently in the final Boat Channel Sediment Characterization Report (BNI 1996). The reported 19.0 percent value was the standard deviation for the test. The error will be corrected in the Work Plan.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

The Bay Protection and Toxic Cleanup Program (BPTCP) report for San Diego Bay (SWRCB 1996) found that urchin sensitivity is high, and results do not necessarily follow in sync with sediment chemistry or amphipod results. The report stated that the *Strongylocentrotus* results be considered in conjunction with solid phase results and chemical measurements, as well as benthic community analyses (the recommendation is not applicable at this stage of site selection). With this in mind, at least two of the Stratum 3 stations (Stations S3S1 and S3S2) would appear to be adequate reference stations because of the low chemistry and high amphipod survival rate in these areas.

BPTCP Station 90104, which is proposed as a reference station for this investigation, was also used as a reference area for NAS North Island. In addition, in its summary report, the BPTCP (SWRCB 1996) concluded that Station 90104 did not warrant further action or hot spot designation due to satisfactory sediment chemistry and bioassay results in that area.

In contrast, a station close to this "no action" area, BPTCP Station 90102, was give a "low" priority ranking for further study, based on chemistry and bioassay results. BPTCP Station 90102 is very close to Station S3S3, which is the station exhibiting the highest (i.e., "worst") toxicity in Stratum 3. Because Station S3S3 has showed low normal *Strongylocentrotus* development, somewhat depressed amphipod survival, and is close to a BPTCP station that has been found to be of some, if not minor, concern, we propose to drop this station from consideration as one of the reference sites.

The results from the bioaccumulation tests will not be considered in the selection of reference sites because of the lack of information available for regional levels of bioaccumulation in San Diego Bay. We do not feel it is appropriate to compare the bioaccumulation results from one station in each stratum against bioaccumulation results from control sediments, which are relatively pristine.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 10: Page 3-21, Fish samples should be kept separated when trawling by performing very distinct runs within each strata or at least separate stratum 1 from the others. If compositing of samples is necessary later, that decision can follow the collection and analysis of these data.	**Response 10:** This issue was discussed at length during an interagency meeting held on 24 June 1997. It was decided at that meeting, that due to physical and safety constraints such as pylons and submerged debris, trawling may not be possible in each of the three strata. This is especially true in Stratum 1 where, in approximately 20 feet of water, a boat is submerged near the middle of the stratum. Therefore, it was agreed that trawls will be run from the middle section of Stratum 2, northwards into Stratum 1. This will constitute the trawling effort within the channel. It was also agreed at the 24 June 1997 meeting that beach seines will be used to sample shallow water areas near eelgrass beds. The seines will target fishes with smaller home ranges and species that are in closer contact with the sediment, such as sculpins or gobies. Whole-body tissue analyses will be conducted on one of these fish species collected by this method, and the tissue chemistry results will be used strictly for ecological risk assessment purposes. Trawling or passive capture methods (e.g., stationary nets) will not be conducted in the reference area due to hazards and boat traffic. Fish tissue data collected for the San Diego Bay Health Risk Study (San Diego County Department of Environmental Health Services 1990) will be used to describe fish tissue concentrations outside of the Boat Channel and associated risks to human health on a regional level.
Comment 11: Page 3-21, Sample collection. Chemical measurements and bioassays must be performed from the samples, split from a single sample; sufficient material may have to be composited from several collections before these samples are split.	**Response 11:** Comment noted. Multiple surface grab samples will be collected from each station and composited by the laboratory. The surface samples from each station will be split for use in both bioassay tests and chemical analyses. The RI Work Plan will be revised to indicate this procedure.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 12: Page 3-22, The same species should be used in this series of tests as was used in the former evaluations, *Rhepoxynius abronius* and *Strongylocentrotus purpuratus*, not *Lytechinus pictus*. Any differences in results between the proposed effort and the former will be questioned based on the difference in species rather than differences in contaminants and may never be explained.	**Response 12:** *Strongylocentrotus purpuratus* (purple sea urchin) will be used in the porewater test to be consistent with the previous investigations. The text will be changed to reflect this correction.
Comment 13: Pages 3-22 and 3-23, Toxicity testing. Both negative and positive controls must be performed as stated; however, spiking tests should be considered to help identify the potential cause of the mortality already observed. In fact, home sediment should be used to "dilute" stratum 1, sediments at a minimum to develop the exposure - response relationship needed to complete this ERA. Serious consideration must be given to the performance of ammonia, sediment particle size and sulfide controls to further delineate the potential causes of sediment impact in the Boat Channel.	**Response 13:** Negative and positive bioassay controls will be performed as stated in the Work Plan. Spiking tests will not be performed. The chemistry data will be evaluated in conjunction with the bioassay results collected from this investigation to assess the trends of response relative to concentration levels. Dilution series of sediment, using "home" or control sediment and channel sediment, may complicate the results further. There may be unknown interaction taking place between *in situ* sediment constituents (synergism, antagonism, additivity), whereby the cause(s) of the biological responses may not easily explained. Measurements of ammonia, particle size, and sulfide will be taken at all of the sediment sampling stations. We will be monitoring the performance of these tests carefully to obtain higher quality and more biologically useful data for these parameters. We do recognize that proper measurement of these parameters is essential in attempting to explain biological responses to sediment.
Comment 14: Page 3-23, If both bioassay tests do not meet the performance criteria, they must be redone rather than to perform more chemistry.	**Response 14:** Comment noted. As agreed during the 24 June 1997 interagency meeting, the RI Work Plan will be modified to indicate that bioassay tests will be conducted again if performance criteria are not met.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 15: Page 4-2, Fish collection. It may not be feasible to separately bag the smaller fish e.g., anchovies, however, these should be counted and weighed.	**Response 15:** Comment noted. Smaller fish will be counted and weighed individually. However, separate bagging of individual fish will depend on size and the mass of tissue required by the analytical laboratory contracted for the chemical analyses of samples.
Comment 16: Page 5-4, Ammonia control replicates should be performed during this testing, and ammonia should be measured in every replicate with pH because of their interdependence.	**Response 16:** Ammonia and pH will be measured daily in control replicates during the performance of the porewater toxicity tests.
Comment 17: Page 6-4, Data evaluation. The previous results have already shown that these areas are significantly different from other areas of the bay, now is the time to establish the exposure - response relationship between the contaminants and the site receptors. The sediment chemistry, the toxicity, and the bioaccumulation results are clearly showing differences between the Boat Channel and other areas of the bay.	**Response 17:** Comment noted.
Comment 18: Page F3-2, Section 3, The most current ERA guidelines include the June 5, 1997 EPA document and the 1996 DTSC document both of which are available and are compatible with each other.	**Response 18:** Comment noted. The most current ecological risk assessment guidelines, U.S. EPA Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final, 05 June 1997 (EPA 540-R-97-006, OSWER 9285.7-25), and Cal-EPA Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities, Parts A and B, July 4, 1996, have been reviewed and included in this section.
Comment 19: Page F3-6, Table 3-1, COCs should include those chemicals determined to be: 1) a major factor in the distribution in the Boat Channel sediments; 2) suspected to have contributed to the observed results of the bioassays; and 3) those chemicals observed in the tissue of the clam bioassay.	**Response 19:** Comment noted. Further focusing of the analyte list, based on past results and historical discharges, was discussed at the interagency meeting held 24 June 1997. U.S. EPA suggested that the list of potential chemicals of concern (COPCs) could be narrowed because some of the contaminants were not found at significant levels in the bioaccumulation tests and that focusing the list of analytes might enhance the analyses. DTSC disagreed strongly and felt that the entire list should be maintained as presented. Bechtel suggested that the full suite be proposed for analysis, because sampling near some of the outfalls has not been previously conducted. A full range of analytes should be included to avoid overlooking potential chemistry hits through premature screening.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 20: Page F53-8, Vegetation; What algal species are present? Are any of the site receptor species dependent upon algae for food?	**Response 20:** Mitchell Perdue, of the SWDIV Natural Resources Division, has been conducting numerous fish surveys and assessments of eelgrass density in San Diego Bay region, which includes the NTC Boat Channel, as part of a baywide monitoring program. He has found that the most important and dominant aquatic vegetation present in the Boat Channel is eelgrass *(Zostera)*. There are as many as 20 to 30 species of green and brown algae also present to a lesser extent. A recent survey map of the Boat Channel generated in 1993 and obtained from SWDIV, Natural Resources Division, shows 25 to 50 percent coverage of the shallow areas in Stratum 1, and variable levels of coverage from 25 to 50 percent to 50 to 75 percent, depending on the location along the shoreline in Stratum 2. Eelgrass density varies from 25 to 50 percent coverage in the surveyed portions in Stratum 3. Fish studies in San Diego Bay (Allen 1996) have found that topsmelt, shiner surfperch, gobies, spotted sand bass, sculpin, round stingray, and California halibut use eelgrass beds. They appear to support juvenile and adult fish populations, and their relationship to fish use and abundance is currently being investigated. It is more likely that the fish species use the eelgrass beds more for cover and habitat than a food source.
Comment 21: Page F3-14, The kingfisher does not seem to be an appropriate surrogate for the California least tern, nor the brown pelican.	**Response 21:** The great blue heron, brown pelican, and least tern will be used as receptors for the ecological risk assessment in place of the belted kingfisher.
Comment 22: Page F3-15, Exposure assessment. At this point in the process, the exposure assessment should involve measurements not estimates. Measurements will be taken in the sediments; they could be taken in the sediment invertebrates and the *Zostera sp.* and any algae present and the fish that are food for the least tern. Further, biological estimates for impacts on the least tern should incorporate the knowledge of the colony that is nearby and assumed to be using the Boat Channel for foraging.	**Response 22:** Comment noted. The exposure assessment will provide actual measurements of sediment chemical concentrations, not estimates, as well as actual tissue levels of prey species of least tern and brown pelican. The text on page F3-15 will be modified to reflect this. All of the relevant biological data available for the NTC least tern colony and other ecological receptors will be assembled for inclusion in the risk assessment. The Navy sponsors an annual survey of this least tern breeding colony

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 23: Page F3-16, Estimation of exposure-point concentration. The exposure-point concentration of chemicals in sediment, water, and fish will be used directly in the assessment of potential risk to organisms exposed via primary pathways. The bioconcentration factors for organic compounds in mammalian and avian prey cannot be estimated by the Travis and Arms (1988) algorithm for cattle, this is not appropriate. The bioconcentration factors developed by Stevens (1992) for arsenic, cadmium, chromium, lead, and mercury in cattle are not appropriate for this effort, nor is the approach used by Baes et al. 1984 for other metals.	**Response 23:** Comment noted. It will be unnecessary to calculate bioconcentration factors because we will have direct exposure values for each receptor from the sediment, water, and fish.
Comment 24: Page F3-18, Characterization of ecological risks. The material presented in this paragraph should be recognized as characterization of toxicological risks, there are no ecological measurements presented. Hazard Quotient approach to characterize risk. The hazard quotient is used in the "predictive phase" of the ERA, not in the validation phase. This is the time in the process when the critical concentration from the exposure - response relationship is shown as a distribution across the site to identify those areas that should be considered for remedial actions.	**Response 24:** The risk assessment for the Boat Channel essentially consists of two parts. First, the risk to organisms from a point source of contamination (i.e., the sediment) will be assessed by comparisons of Boat Channel sediment chemistry and bioassays to reference areas and data from other studies. Second, the risk to organisms from a nonpoint source of contamination (i.e., the water and fish) will be assessed for the marine mammal and birds by calculation of hazard quotients (HQ). The HQ calculations will be based on exposure to fish and water for the birds, and on fish, water, and sediment to the marine mammal. The risk from each type of exposure at each specific sampling location can be segregated to develop an exposure-response relationship. This relationship should be strongest for the bioassay samples (point-source contamination), but it may be possible to observe some larger trends that are geographically based for the nonpoint-source contamination based on the findings for the mammal and birds. Also, see response to Comment 25 for further explanation of how the risk assessment results may be used for remedial action planning.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Comment 25: page F3-19, Ecological significance. This is one of the most important efforts in the ERA process. The collection of data through the ERA process provides the foundation for establishing the level of the contaminant concentration throughout the site. This is based on adequate sampling in the boat channel to describe the contaminant drivers. A discussion of the relationship between the test results of the surrogate species and the contaminant concentrations as an exposure - response relationship is paramount in the establishment of any level of causal relationship between the contaminants and the site specific receptors. These data are then used to determine the potential significance for the spatial and temporal patterns of the significant effects across the site. An evaluation of the distribution of these data in the boat channel and their impact should be compared to similar resources in the larger environs to place the overall perspective of the impact in the Boat Channel with the San Diego Bay. This discussion of contaminants, receptors, intensity and severity of impacts within the context of the Boat Channel and the San Diego Bay provides the basis for estimates for recovery of those areas that are significantly impacted.	**Response 25:** The Boat Channel ecological risk assessment will be primarily based on sediment chemistry and sediment and porewater bioassay results, and it may include benthic organisms species composition and density results. The analyses of benthic organisms will take place only if needed to characterize sediment chemistry, water chemistry, or bioassay results more definitively. Specific areas of sediment or water in the Boat Channel that pose various degrees of risk to ecological receptors will be delineated with some certainty. In addition, general risk to marine mammal (harbor seal) and bird (great blue heron, brown pelican, and least tern) receptors will be assessed by calculating HQs based upon exposure to site and reference area sediment, water, and/or contaminated prey. Also, fish will be collected and examined for morphological abnormalities, and tissue samples will be analyzed for contaminants. Available ecological information, such as trends in wildlife uses of the Boat Channel, will be assembled and considered in light of other risk assessment findings. The attached table (Table 1) shows the media to be analyzed or measured, the potential receptors for each medium (for the site conceptual model that shows potential exposures see Appendix F, Figure 3-1), and the risk assessment that will be performed.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Clarence A. Callahan

Table 1

Affected Media to be Measured	Receptors to be Considered	Risk Assessment
Sediment chemistry, deep	Benthic infauna	Chemistry screened by published standards Chemistry compared statistically to reference samples Chemistry compared to other San Diego Bay data from previous studies
Sediment chemistry, shallow	Benthic infauna Bottom fish Marine mammal	Chemistry screened by published standards Chemistry compared statistically to reference samples Chemistry compared to other San Diego Bay data from previous studies bioassay tests Benthic species composition and density compared to reference samples Benthic species composition and density compared to data from other relevant studies Marine mammal hazard quotient
Fish, mid-depth and bottom	Deep fish Marine mammal	Fish tissue chemistry compared to reference samples Fish tissue chemistry compared to published values (if available) Marine mammal hazard quotient
Fish, shallow and surface	Surface fish Great blue heron Brown pelican Least tern Marine mammal	Fish tissue chemistry compared to reference samples Fish tissue chemistry compared to published values (if available) Great blue heron, brown pelican, least tern, and marine mammal hazard quotient

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Received on 04 August 1997 Weston	
GENERAL COMMENTS **WORK PLAN**	
Comment 1: In general, the Remedial Investigation (RI) Work Plan (WP) has made good use of the existing data to design an approach to a remedial investigation. However, there are several issues related to the approach for the evaluation of extent of contamination and the assessment of risks discussed in the specific comments.	**Response 1:** Comment noted.
Comment 2: TBT should be measured in interstitial water and the resulting concentration screened against 0.15 mg/L TBT as the ion. This approach will better account for the bioavailability of TBT and the potential effect on aquatic organisms. Bulk sediment concentrations are difficult to screen because of the multiple confounding factors affecting TBT partitioning in the environment and thus its bioavailabilty.	**Response 2:** Tributyltin will not be measured on the interstitial water during the RI. Historical data collected for tributyltin in the Boat Channel and environs are based on bulk chemistry analysis. To provide consistency, sediment concentrations of tributyltin will be analyzed via the methods as proposed in the Work Plan. Reference articles or methods discussing the analytical methods for measurement of tributyltin as suggested in this comment and interstitial concentrations as related to bulk sediment chemistry are welcomed and will be reviewed for applicability to this investigation.
Also note that TBT samples must be collected in polycarbonate containers because significant and irreversible adsorption of organotin compounds has been documented for glass, polyethylene, and teflon containers.	Comment noted. The RI Work Plan will be revised to indicate that samples for organotin analyses will be collected and stored in polycarbonate containers.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

SAMPLING PLAN	
Comment 3: In general, the field sampling plan (FSP) appears to lack sufficient detail for successful implementation. The field sampling plan is a working document and needs to be written so that it provides all information to field staff responsible for implementing the effort. As such, it should include a list of all the station coordinates to be input into the navigation software and a complete listing of the specific analyses to be requested from the labs for each sample. Sample handling and shipping requirement should be clearly identified; this is particularly important because a number of different types of samples will be collected. The sediment depth and required volume for all samples should be clearly identified. All relevant SOPs should be summarized and attached as appendices. Contingency plans for specific problems or events should be spelled out to the degree possible. An equipment checklist would also be helpful.	**Response 3:** Comment noted. Figure 3-4 in the Work Plan and Figure 2-1 in the FSP will be modified to make the sampling locations clearer. However, specific station coordinates will not be determined until the geophysical clearance is completed at the beginning of the field effort. Sample volume information will be added to Table 4-1 of the FSP. The Navy CLEAN program SOPs have been reviewed by DTSC and U.S. EPA. Controlled copies of the SOPs are with Ms. Sherrill Beard of DTSC and Ms. Bonnie Arthur of U.S. EPA.
QUALITY ASSURANCE PROJECT PLAN	
Comment 4: Overall, the Quality Assurance Project Plan (QAPP) is complete and well written. However, information about biological testing protocols needs to be included in this document so that a complete record of test protocols is available to the reviewers and the laboratories performing them. Generally, the QAPP should be written as a fairly complete guide for the laboratories that will be conducting the analyses.	**Response 4:** U.S. EPA and American Society for Testing and Materials methods will be utilized for biological testing; therefore, the inclusion of testing protocols in the QAPP is not necessary. Laboratory specific protocols are not available at this time because the laboratory must be selected by bid at the beginning of the field effort.
Comment 5: As part of the previous review of the report on the sediment characterization of the Boat Channel (Bechtel, July 1996), a technical issue with respect to the selection of bioassay species was raised. Specifically, use of *Rhepoxynius abronius* for testing the toxicity of fine-grained sediments (greater than 60 percent fines) was not recommended because of the potential confounding effects this type of substrate has on this amphipod species' response. However, no other species has been proposed for the amphipod bioassay. This is a fairly substantive issue and must be addressed before implementation of the field sampling.	**Response 5:** This issue was discussed during the interagency meeting held on 24 June 1997, and it was agreed that *Rhepoxynius abronius* will be used for testing the toxicity of fine-grained sediments.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

RISK ASSESSMENT WORK PLAN	
Comment 6: In general, it appears as though the details of the risk assessment approach will require further discussion between the Navy and the agencies. Potential modifications may be required in order to assure that the information evaluated in the risk assessment will be able to support cleanup decisions. Several issues identified by reviewers are presented below.	**Response 6:** Comment noted. An interagency meeting was held on 24 June 1997 to discuss the RI Work Plan and agency concerns concerning approach and methodology. In addition, an interagency telephone conference was held on 09 July 1997 with human-health risk assessors from U.S. EPA, DTSC, and Bechtel to address agency concerns.
Comment 7: The conceptual site model for site-related exposures has omitted benthic infaunal and epifaunal organisms. It is important to include these type[s] of communities and organisms in the model because of their direct contact with and ingestion of the sediment. In addition, infaunal and epifaunal organisms represent the prey species for many of the fish and shorebirds proposed for evaluation in the risk assessment and therefore provide a more direct link to the sediment for these higher trophic level species. Also, because of their typically sedentary nature, infaunal (and to a large degree, epifaunal) organisms represent site-specific conditions.	**Response 7:** Comment noted. The conceptual exposure model will be modified to include both benthic infaunal and epifaunal invertebrates. The inclusion of these potential receptors is indeed appropriate for this site.
Comment 8: The usefulness of assessing risks based on pelagic or highly motile benthic fish species to support site-specific cleanup decisions is very limited. As suggested by the stormwater study, the main route of contaminant exposure in the Boat Channel may no longer be stormwater/surface water runoff. Rather, contact or ingestion of contaminant sediment appears to be the primary current pathway for exposure of aquatic organisms. It is strongly recommended that one or more infaunal species be included for evaluation in the risk assessment. If the areas to be evaluated do not support sufficient abundance of a target infaunal species, then a laboratory bioaccumulation study should be conducted rather than relying solely on fish bioaccumulation.	**Response 8:** The use of fish species in the ecological risk assessment has been discussed in detail with state and federal regulatory agencies throughout the course of development of the Work Plan. It is believed that to assess risk to piscivorous receptors in the Boat Channel, collection and analysis of fish tissue is necessary so that dose concentrations are based on real, rather than estimated value. All parties involved understand that the concentrations in fish tissue may not necessarily be tightly correlated to sediment concentrations. Sediment contamination and possible biological effects are being addressed through the performance of solid phase and porewater bioassays, sediment chemical analyses, and possible performance of benthic community analyses.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 9: The development of assessment and measurement endpoints needs to be more definitive. The assessment endpoints should identify some specific attribute of a population or community that is being protected (i.e., something more than "the health of ..."). As an example, the assessment endpoints might be stated as follows: • diversity and abundance of fish prey species (a.k.a. benthic infauna) • diversity and abundance of forage fish • abundance of least tern The measurement endpoints would logically flow from the selection of the assessment endpoints. Using the above example, the measurement endpoints could then be: • toxicity of sediments to amphipods and echinoderm larvae (i.e., if it is toxic to these more sensitive individual species, then the diversity and abundance of the benthic community would likely be adversely affected). • body burdens in fish (this endpoint would then be compared to benchmarks representing mortality, reduced growth, impaired immune response or other deleterious effects that would reduce the survival of exposed individuals and ultimately affect the diversity and abundance of the forage fish populations. • maternal transfer of contaminants to their eggs (this measurement endpoint is actually calculated and then compared to benchmarks representing lethality or deformity in bird embryos). The assessment and measurement endpoints should be reconstructed using a method similar to this example.	**Response 9:** A similar comment was submitted by DTSC (DTSC Specific Comment 3 by Dr. James Polisini) in regard to the development of appropriate assessment and measurement endpoints. As a result, the selection and discussion of these two types of endpoints has been rewritten to reflect the suggestions given in this and the DTSC comments.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

SPECIFIC COMMENTS

WORK PLAN

Comment 1: Section 1.1.2, page 1-4. The investigation of surface water inputs and flow does not address sediment bedload transport issues affecting contaminant distribution. Typically, tidal action serves to "pump" sediment along the bottom towards the blind ends of slips and waterways over time. Therefore, there is some potential for sources at the mouth of the Boat Channel or nearby areas within San Diego Bay to contribute to the contaminant load in the Boat Channel.	**Response 1:** Comment noted.
Comment 2: Table 2-7. Although PCBs were analyzed as congeners and the reported effects levels are typically based on total PCBs or Aroclor-specific values, it is important to use the congener data for the purpose of screening for potential biological impacts. Please present a sum of all of the detected congeners. NOAA has done a fair amount of work looking at correlations between Aroclor sums and congener sums. Typically, if the sum of the congeners is multiplied by about 2.0 the result is an estimate of total PCBs based on Aroclors. This value can then be compared to the ER-L and ER-M for PCBs.	**Response 2:** Comment noted. Summations of all the detected congeners will be presented in the final RI report.
Comment 3: Figure 3-2. Please include benthic organisms as both an exposure medium for higher order receptors and ecological receptors in the conceptual site model.	**Response 3:** Comment noted. The conceptual exposure model has been modified to include both benthic infaunal and epifaunal invertebrates. The inclusion of these potential receptors is indeed appropriate for this site.
Comment 4: Section 3.3, page 3-7. While a tiered approach is reasonable, it should be recognized that the bioassays that may be used to trigger further chemical evaluations will not reflect the toxicity of bioaccumulative compounds that may be of concern at the site. In addition, there is some question about the sensitivity of some species of amphipods to tributyltin. Therefore, it is even more important to select a site-specific organism (such as clams) for bioaccumulation testing in this work plan. These bioaccumulation tests would proceed in parallel with the bioassays. If contaminants of concern were detected in tissues, then bulk sediment chemical analyses would also be triggered.	**Response 4:** Comment noted. It is agreed that results from the bioassay testing may not reflect the toxicity of bioaccumulative compounds to site-specific organisms. However, for decision-making purposes, it is felt that the level of analytical work presented in this Work Plan is adequate to determine the need for further analyses.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 5: Section 3.5, page 3-7. All background or reference samples used in the toxicity evaluation must meet performance criteria for the decision "trigger" to be valid. If there are reference performance failures, then the control samples should be substituted. In the case of amphipod mortality, a numeric criterion of greater than or equal to 25 percent mortality could be used, regardless of reference performance. As noted in the previous review of the sediment characterization of the Boat Channel (Bechtel, July 1996), the area at the mouth of the Boat Channel may not be an appropriate background area because of demonstrated toxicity of the sediments at the majority of the sites sampled. S3S1 was the only location in the recent historical studies that did not have a demonstrated biological impact. However, this location is fairly course-grained relative [to] the sediments in Strat[a] 1 and 2, and may not be a good comparison for the responses measured in these sediments. A fine-grained reference area should be identified and used in this study. If the results of the two bioassays proposed do not concur, this should not be interpreted as an uncertainty. The lack of concurrence is highly likely because in one case lethality in an adult crustacean is being measured and in the other a sublethal effect in echinoderm embryos is being measured. These tests represent vastly different phyla and life stages with differing sensitivities, so concordance in results would not be anticipated except in sediments with highly elevated chemistry. It is recommended that a single bioassay "hit" also be interpreted as needing confirmation by chemical analysis.	**Response 5:** Failure of bioassay tests to meet performance criteria was discussed at the interagency regulatory meeting held on 24 June 1997. It was agreed that the bioassay tests would be conducted again before decisions are made for further analytical testing. For a response concerning reference areas, please refer to the response to Comment 9 submitted by Dr. Clarence Callahan of U.S. EPA. Regarding grain size, Station 90104 has been characterized as a fine-grained reference site. A single bioassay "hit" in either the *Rhepoxynius* or *Strongylocentrotus* test will not be interpreted as needing confirmation by chemical analysis. Interpretation of both tests in concert, as well as the water-quality parameters measured during the actual performance of the tests in the laboratory, is imperative and was agreed upon at the agency meeting held 24 June 1997. In addition, toxicity testing with concurrent bulk sediment testing in San Diego Bay has shown that the *Strongylocentrotus* test is highly variable in response, with depressed development observed with sediments with low chemical concentrations or normal development associated with high sediment concentrations, as well as the expected responses (high toxicity with high concentrations and low toxicity with low concentrations). Therefore, agency consultation and concurrence on the interpretation of the bioassay results will be necessary after statistical manipulation of the bioassay data to obtain consensus at decision points.
Comment 6: Table 3-1. The units for the target reporting limits for organics appears to be in error; it would appear that the units should be µg/kg. If these units are correct, then the target reporting limits are unacceptable. In addition, it is recommended that the ER-Ls and ER-M be updated based on the latest report [Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environmental Management 19(1): 81-97.]	**Response 6:** Comment noted. The units for the target reporting limits for organics will be corrected on Table 3-1. Comment noted. Table 3-1 will be updated with the current ERL and ERM values.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 7: Figure 3-4. Please overlay bathymetry (depth contours) on the sample location map so that intertidal and subtidal areas can be identified. Nearshore sampling transects should be modified so that samples will be collected in nearshore shallow areas in the vicinity of outfalls. It does not appear that this procedure was used to select sample locations.	**Response 7:** The nearshore sampling points as presented in the Work Plan are located in the vicinity of outfalls. Figure 3-4 will be modified to make the sampling locations clearer. We have obtained the electronic files of bathymetry data for the NTC Boat Channel. Prior to field sampling, we will overlay the sampling locations on the bathymetric contours to assure that sampling will be conducted in the proper depth and location.
Comment 8: Section 3.7.1.2, page 3-22. Current EPA guidance for bioaccumulation sampling requires that replicate tows (a minimum of three) be conducted. Tissue composites are then prepared from the resulting catch from each tow. Please include this as part of the design.	**Response 8:** Replicate tows will be conducted as physically possible and necessary to collect adequate volumes of fish tissue for analysis. The Boat Channel is not a large body of water and is bounded by eelgrass beds on both shorelines. As a consequence, trawling will be conducted in a manner that causes the least disturbance to the eelgrass habitats.
Comment 9: Section 3.7.2.1, page 3-23. It is unclear how the dilution bioassays will be used in decision making. The response for the whole sediment or whole water bioassay is the one that will be used to determine the need for chemical testing. It is recommended that the dilution bioassays be dropped.	**Response 9:** The RI Work Plan will include the dilution series bioassays as discussed during the 24 June 1997 meeting with the regulatory agencies. The results from the dilution series will not be used directly in the decision-making process; only the results from the 100 percent concentration porewater will be used. The IC_{25} will be calculated from the dilution series and will be used only for informational and descriptive purposes.
Comment 10: Section 3.7.2.1, page 3-23. Please see Comment 5 regarding Section 3.5 (decision rules).	**Response 10:** Comment noted.
Comment 11: Section 4.2.1, page 4-2. It is important to identify the holding times for sediment to be used in the bioassays. Based on experience with holding times for bioassays conducted in the Puget Sound region, holding times have a significant effect on interstitial ammonia. Ammonia production is occurring in sediment all the time, but begins to build up from the moment of collection because sediments are no longer being flushed. It is strongly recommended that bioassays be initiated within a few days of collection. If possible, interstitial ammonia should be measured at the beginning and the end of each test.	**Response 11:** Comment noted. The RI Work Plan will be revised to indicate a 2-week holding time for bioassays based on Puget Sound Protocols and Guidelines (PSWQA 1996). As agreed during the 24 June 1997 interagency meeting, the RI Work Plan will be modified to include daily monitoring of pH and ammonia during the bioassay tests.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 12: Section 4.2.2, page 4-2. Please see Specific Comment 4 on the QAPP regarding sampling containers for water to be analyzed for TBT.	**Response 12:** Comment noted. The RI Work Plan will be revised to indicate that water samples for organotin analyses will collected and stored in polycarbonate containers.
Comment 13: Table 5-1. Please identify the holding times that will be followed for bioassays, regardless of the absence of guidance from ASTM.	**Response 13:** Comment noted. Table 5-1 will be revised to indicate a 2-week holding time for bioassays based on Puget Sound Protocols and Guidelines (PSWQA 1996).
Comment 14: Section 5.3, page 5-3. As stated in General Comment 4, *Rhepoxynius abronius* is not recommended for use in the Boat Channel RI because of the fine-grained nature of the sediments in Strat[a] 1 and 2. *Ampelisca abdita* is a more appropriate species because of its great tolerance for fine-grained sediment. Other amphipods may also be acceptable.	**Response 14:** This issue was discussed during the interagency meeting held on 24 June 1997, and it was agreed that *Rhepoxynius abronius* will be used for testing the toxicity of fine-grained sediments.
As stated in Specific Comment 10, interstitial ammonia should also be measured at the be[ginn]ing and the end of each test.	As agreed during the 24 June 1997 interagency meeting, the RI Work Plan will be modified to include daily monitoring of pH and ammonia during the bioassay tests.
Comment 15: Section 6.2.1, page 6-2. It is recommended that the chemical and toxicity data be presented in a table as exceedance ratios (above ER-L and ER-M) or enrichment ratios (above background for each contaminant detected at each sampling station). This presentation format has been successful in allowing reviewing agencies to formulate decisions based on the data. Work in progress at the West Basin, Long Beach Harbor can provide a model.	**Response 15:** Comment noted. Chemical and toxicity data will be presented as exceedance ratios (above ERL and ERM) or enrichment ratios (above background for each contaminant detected at each sampling station) in the final RI report.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 16: Section 6.3.1, page 6-4. The data evaluation process needs some clarification, and potentially some modification. This section starts out with a statement of an hypothesis but then describes a 95th UCL calculation. Use of the 95th UCL to characterize the reference or background sites is an appropriate approach, but this is not part of a statistical hypothesis test; rather, it is typically used to screen individual sample data from a potential site. Please clarify whether it is being proposed to initially screen the data and then perform statistical pairwise tests to confirm differences between reference and site strata or whether only statistical testing will be used. If it is the latter case, the calculation of a 95th UCL to identify impacted sites (i.e., site characterization) does not serve a purpose because the proposed statistical tests are based on the comparison of means.	**Response 16:** Comment noted. The first part of this comment is correct in stating that the calculation of the 95th percentile upper confidence limit (UCL) is not part of the statistical hypothesis test. The evaluation of the sediment chemistry data will be based on statistical comparisons of means from the various strata. The section has been modified to reflect this.
Given the proposed sample size for some of the sample matrices (beach sediment, water, tissue), there will not be enough data to definitively test for statistical distribution. Some statisticians recommend making decisions regarding data transformations on the theoretical distribution of the entire population, rather than a subset (i.e., a small group of samples). Using this approach, chemical data in sediment and tissue are typically log-normally distributed while percentage data (i.e., bioassay responses) require an arc-sine transformation to approximate a normal distribution. It should also be noted that Bartlett's test for homogeneity of variances has little utility in these cases because it is strongly affected by non-normality.	The chemical measurements of surface water and fish tissue will not be used in any types of comparisons between the channel and bay. Rather, surface water and fish tissue concentrations will be used only in risk/hazard calculations for human-health and ecological risk assessment. Comparisons will be performed only for toxicity and chemistry. Data transformations that may be necessitated before testing for statistical differences will be dependent on the distribution of the sample data.
If a multiple-sample comparison (ANOVA or nonparametric equivalent) approach will be used to evaluate similarities among all strata (including background) an a *posteriori* pairwise test must be selected to identify how areas are different from other areas. It is recommended that a Dunnett's one-tailed pairwise test be performed with the ANOVA because the number of comparisons can be limited to site areas versus background. An equivalent test is available for a nonparametric version of the ANOVA. However, if an ANOVA is used, the experiment-wise error rate will need to be set higher than 0.05 to ensure that the pair-wise error rate is about 0.05. It is recommended that an alpha of 0.1 be used with the ANOVA.	Comment noted.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

FIELD SAMPLING PLAN	
Comment 1: Section 3.2.1, page A3-2. A number of details are missing from this section. It may be that some of the issues raised can be addressed by existing SOPs. If so, they should be attached to the final FSP. As an example, van Veen grabs have differential "bite" depending on substrate type. Other sediment management programs have developed acceptance criteria for grabs. Please explain what will be used to determine if a grab is acceptable for this investigation. Homogenization of large volumes of sediment can be very difficult. Collection of sediment from each grab into a large stainless steel "soup pot" and use of a stainless steel paint stirrer mounted on an industrial drill has worked well on other projects.	**Response 1:** Comment noted. As stated on page 4-2 of the Work Plan and A3-2 of the FSP, the top 0.5 feet of sediment collected in each grab will be used regardless of the bite depth. Sample homogenization will be conducted by the bioassay laboratory utilizing a stainless steel mixer.
Please specify the depth to which beach sediments will be collected. Please explain how consistency in sample depth will be maintained.	The beach sediment samples will be collected at the surface from 0 to 6 inches.
It is very important that the sediment submitted for chemical analyses be taken from the homogenized sediment used in the bioassays. Please clarify whether this will be done.	Multiple surface grab samples will be collected from each station and composited by the laboratory. The surface samples from each station will be split for use in both bioassay tests and chemical analyses. The RI Work Plan will be revised to clearly indicate this procedure.
Comment 2: Section 4.2, page A4-1. It is important that sediments be visually characterized following sampling. Notation of the presence or absence of wood debris, plastics, oil sheen, odor, depth of the redox layer (etc.) are important observations that may not be captured by a photo. Please include a written log of sample observations as part of the field protocol.	**Response 2:** Comment noted. Section 4.2 will be revised to read "The logbooks record all field methods used, including sampling, *field observations*, waste handling, and decontamination of equipment." In addition, Sections 3.7.1.2 and 4.2.1 of the Work Plan as well as Section 3.2.1 of the FSP will be revised to indicate that all sediment samples will be logged by a qualified geologist. Field observations by the project biologist will also be recorded.
Comment 3: Section 4.6.1, page A4-1. It is strongly recommended that the sample ID be expanded to include sample matrix (e.g., sediment, tissue, water) and sample interval (0 to 0.5 feet etc.). A sample ID is ideal if it provides a key or code to all the types of information that would be used to sort, display, or report the data by.	**Response 3:** The Bechtel Environmental Integrated Data Management System (BEIDMS) is designed for a nine-character sample identification. Therefore, the sample identification scheme specified in the RI Work Plan is consistent with CLEAN II program requirements and will be used for this investigation.
Comment 4: Table 4-1. Amber glass is not an appropriate container for organotins, particularly for water samples. Please see QAPP Comment 4 for further details.	**Response 4:** Comment noted. The RI Work Plan will be revised to indicate that water samples for organotin analyses will collected and stored in polycarbonate containers.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

QUALITY ASSURANCE PROJECT PLAN	
Comment 1: Table 3-4. Target method reporting limits are presented on a wet weight basis while ERLs and ERMs are on a dry weight basis. However, target limits are sufficiently low that detection limits should be below criteria even when corrected for moisture content. It is strongly recommended that the current Puget Sound Dredged Disposal Analysis program value for TBT in sediments be used as the screening for TBT; thus the target method reporting limit should meet or beat that value.	**Response 1:** Comment noted. The Puget Sound Dredged Disposal Analysis program screening value for tributyltin is 0.03 mg/kg. Table 3-4 will be revised to include this information.
Comment 2: Table 3-5. It would be useful to footnote analytes in cases where target reporting limits are above criteria and explain why reporting limits are higher. It appears that, with few exceptions, reporting limits are as good as can be achieved with current, routinely used analytical methods.	**Response 2:** Comment noted. The listed regulatory threshold limits that are less than the method reporting limits will be bolded and footnoted on Table 3-5 for reference.
Comment 3: Table 3-6. Neither the table nor the associated text explains what media will be used as a tissue laboratory control sample.	**Response 3:** The analytical laboratory selected to conduct the tissue analyses periodically collects tissue for use as control sample media. The species used depends on the availability at the time of collection. This information will be provided in the RI report.
Precision criteria presented for soil and tissue may be overly stringent with the low detection limits requested, particularly if the comparison is made between duplicate sample analyses rather than MS/MSD results. It would be appropriate to determine historical laboratory RPD ranges for the listed analytes and matrices.	The precision criteria presented for soil are based on historical laboratory relative percent difference (RPD) ranges. Historical laboratory RPD ranges for tissue are not available due to variability of these criteria between organism (e.g., RPD for tissue analyses of butterfish would be different than that for sea bass). Instead, the precision criteria listed would be used as guidance, and precision will be evaluated for the tissue samples on a case-by-case basis. Per U.S. EPA criteria, results that are less than four times the detection limit are not used for calculation of precision.
Comment 4: Table 4-1. Water samples for organotin analysis should be collected and stored in polycarbonate containers. Significant and irreversible adsorption of organotin compounds has been documented for glass, polyethylene, and teflon bottles.	**Response 4:** Comment noted. The RI Work Plan will be revised to indicate that water samples for organotin analyses will be collected and stored in polycarbonate containers.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 5: Table 4-1. Specify the type of bioassays to be performed and the method to be employed. Plastic bags are not appropriate containers for storage of porewater for bioassay studies. Plastic tends to leach phthalates and adsorb organics from the water. Holding time should be minimized to avoid loss or degradation of contaminants which might be present.	**Response 5:** Comment noted. Table 4-1 will be revised to remove plastic bags as appropriate containers.
Comment 6: Section 6.4, page C6-4. Overlying water in bioassays should also be tested for ammonia and sulfide. It is also recommended that interstitial ammonia be measured at the beginning and end of each test.	**Response 6:** Comment noted. As agreed during the 24 June 1997 interagency meeting, the RI Work Plan will be modified to include daily monitoring of pH and ammonia during the bioassay tests. Sulfide will also be monitored.
DATA MANAGEMENT PLAN	
Comment 1: Section 3.3, page D3-3. Please clarify whether double blind data entry will be used for manual data entry. If not, please explain how manual entry will be verified for accuracy.	**Response 1:** Double-blind data entry is not conducted within the CLEAN II Program. Electronic deliverables are used for data loading whenever possible. Verification of manual data entry is conducted by the database coordinator or assignee using the original field documentation.
RISK ASSESSMENT WORK PLAN	
Comment 1: Section 2.1, page F2-1. It is more appropriate to drop chemicals that may represent a risk but are similar to regional levels in the risk management step, rather than in the COPC identification step. As an example, some pesticides are regionally elevated AND exceed predictive effects levels in sediments. In this case, it is requested that these chemicals be retained in the risk assessment along with a decision of regional distribution issues.	**Response 1:** Comment noted. Chemicals in the Boat Channel that may present risk but are found to be similar to regional levels will be retained through the risk assessment process and will not be screened at the COPC identification stage. The text will be modified to reflect this.
Comment 2: Section 2.2.4, page F2-6. In no case (regardless of sample size) should the 95th UCL exceed the maximum value for the data set being used to calculate the exposure point concentration. Please also see the Specific Comment 15 (Section 6.3.1 of the Work Plan) regarding testing for statistical distributions.	**Response 2:** Comment noted. Section 2.2.4, page F2-6 will be corrected. If the calculated 95th percentile UCLs exceed the maximum values for the data set being evaluated, the maximum value will be used to calculate exposure-point concentrations.
Comment 3: Section 2.3, page F2-11. The cancer slope factor for PCBs should reflect the revisions that were published in the fall of 1996.	**Response 3:** Comment noted. The most recent PCB cancer slope factors will be used in the human-health risk assessment.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 4: Section 3.4.2, page F3-4. A number of different ecological receptors have been mentioned as being of concern or having the potential for occurring in the Boat Channel. Other than the least tern, it is not clear what the targets will include. It is recommended that preferred target species be identified based on the assessment endpoints (see General Comments for examples). Alternative species representing similar trophic levels or habitat requirements could also be identified in case the target species are not present in sufficient abundance to support the RI. In addition, the discussions of potential species to be collected should be consistent throughout the document.	**Response 4:** The assessment and measurement endpoints will be clarified in both the Work Plan and Ecological Risk Assessment Work Plan. Consistent identification of ecological receptors between the different sections and work plans has been included in this clarification. To reiterate, the receptors proposed for this investigation are benthic invertebrates, fish, great blue heron, brown pelican, least tern, and harbor seal.
Comment 5: Section 3.5.3.4, page F3-10. The potential for contaminants to move from the Boat Channel to San Diego Bay as bedload is highly unlikely. Blind-ended waterways tend to act as sinks for sediment. The contaminant distribution, and gradients in grain size and total organic carbon suggest that this is also the case for the Boat Channel.	**Response 5:** Comment noted.
Comment 6: Sections 3.5.3.8 and 3.5.3.9, pages F3-13 to F3-15. These sections need to be revised. Please see discussion and examples in the General Comments on the Risk Assessment Work Plan. It is very important that these endpoints be clearly identified in the work plan. As an example, body burdens in fish will be measured but it is not clear how that relates to the ecological attribute that is being preserved and what effect (related to that attribute) will be evaluated--growth, mortality, immune function, fish fry viability as predicted by maternal transfer to egg or something else. Please also recognize that the bioassays represent a measurement endpoint tied to the abundance of the benthic community (aka fish food) and should be included in the risk assessment. They are particularly valuable because very little extrapolation or modeling is necessary to evaluate the risks to these receptors.	**Response 6:** Clarification of the assessment and measurement endpoints will be included in both the Work Plan and Ecological Risk Assessment Work Plan. Regarding the comment on fish tissue analysis, the measured concentrations are not intended to describe attributes to be preserved for the fish themselves, but rather relate to effects to receptor populations such as the brown pelican and least tern. We also do recognize that the bioassay results are actual, not estimated, measurement endpoints that will be used in the weight-of-evidence approach in the overall assessment of potential ecological risk.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 7: Section 3.7, page F3-17. Impacts to the benthic community should be presented and discussed in both the predictive and validation phase of the Navy's risk assessment approach. NOAA's effects ranges can be used to predict the likelihood of impacts and can be used as the denominator in a calculation of a hazard quotient for each chemical detected. The proposed bioassays then represent a validation (or refutation) of the prediction (with the exception of bioaccumulative compounds).	**Response 7:** We agree that values such as the NOAA effects ranges are predictive guidelines of benthic impacts and that the proposed bioassays represent a validation of the prediction of impacts to benthic communities. With regard to site-specific benthic communities, the inclusion of benthic community analysis of field collected samples will be decided after discussion with the regulatory agencies about the bioassay and sediment chemistry results. Risks to ecological receptors will be based on the bioassay results, sediment chemistry results, and calculation of hazard quotients for the designated receptors (great blue heron, brown pelican, least tern, and harbor seal), which in turn will be dependent on the chemistry results from sediment, surface water, and fish tissue analyses. The effects ranges as published by Long et al. (1995) will be considered for use in the HQ calculations; however, NOAA has emphasized that the ERL/ERM values are guidelines, and their use in other applications, such as ecological risk assessment should proceed with the caveats in mind.
Comment 8: Section 3.8, page F3-17. The risk assessment work plan needs to describe how all of the predictive and measured effects data will be integrated to present the likelihood of impacts to the selected receptors. Please explain what the holistic manner will entail. Please consider ways of representing the data that allow integration of all the predicted and measured effects. Please consider calculations and presenting a quotient for all the endpoints (sediment chemistry, tissue, bioassays) in a matrix so the reviewers can evaluate the probability of impacts.	**Response 8:** The sediment chemistry data, bioassay results, and results from the hazard calculations for the ecological receptors will be used in a cumulative weight-of-evidence approach to describe the likelihood of impacts to the environment. We will consider the use of descriptive data analyses such as those used in the Bay Protection Toxic Cleanup Program Final Report for San Diego prepared by SWRCB, NOAA, and California Department of Fish and Game (1996) as well as classification methods such as the sediment quality triad approach, to describe the nature and extent of sediment contamination and degraded environments.
Comment 9: Table 2-8. Please check the footnotes for this table. For example, S – statistically significant from the control at the 0.5 level should be 0.05 level.	**Response 9:** Comment noted. Table 2-8 will be revised.
Comment 10: Section 2.4.2, page 2-32. It would be very helpful for reviewers if the target organisms used in the bioaccumulation study were identified in this document rather than cross-referenced from prior documents.	**Response 10:** Comment noted. The RI Work Plan will be revised to indicate the target organism used for the bioaccumulation study during the sediment characterization of the Boat Channel.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Weston

Comment 11: Section 2.4.3, page 2-42. Appendix C reporting the bioassay results was not provided as part of the Work Plan. Please include this appendix.	**Response 11:** Comment noted. The reference to Appendix C on page 2-42 is an error. The RI Work Plan will be revised to "The toxicity report is included in the final Report Sediment Characterization of the Boat Channel (BNI 1996b)."
Comment 12: Section 3.7.1.1, page 3-18. The locations of proposed sample locations do not seem to match the text. For example, it is difficult to discern a nearshore station from a deep or channel station in Figure 3-4. Please clarify or number the stations so that they can be listed in the text.	**Response 12:** Comment noted. Figure 3-4 in the Work Plan and Figure 2-1 in the FSP will be modified to make the sampling locations clearer.
Comment 13: Tables. Many tables have footnotes that continue onto the next page (e.g., Table 2-1; Attachment F, Table 2-2, etc.). The continuation of the table is noted, but the subsequent continuation of the text is not indicated. It would be helpful to indicate the text section that is being continued.	**Response 13:** CLEAN II documents are formatted such that tables follow their first callout. The text then continues thereafter.
Comment 14: The use of the word "stratum" to describe an area or zone is misleading because "stratum" describes depth. Please consider renaming the sampling areas.	**Response 14:** The stratum were defined and discussed in previous investigations of the Boat Channel. Changing terminology at this time is not appropriate.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from William T. Hogarth

Written on 18 July 1997 Received 4 August 1997 William T. Hogarth, Ph.D. Acting Regional Administrator National Marine Fisheries Service, Southwest Region Naval Training Center	
Comment 1: We suggest that as part of the site characterization work, the areal coverage of the eelgrass beds on both sides of the channel be mapped and included in your evaluation. This information would be useful to field sampling crews working in the area.	**Response 1:** We have received from the Natural Resources Division of SWDIV a map of the Boat Channel showing eelgrass density along the shorelines. The data were collected in 1993 using sidescan sonar and the global positioning system (GPS) to create the polygons and density classes. The density classes are divided into the following ranges: 75 to 100 percent cover, 50 to 75 percent cover, 25 to 50 percent cover, and 0 to 25 percent cover. Eelgrass densities in the Boat Channel vary from 25 to 75 percent, depending on location. This information will be provided to the sampling crews before mobilization.
Comment 2: Secondly, we urge that the use of otter trawls for collecting fish be reexamined. Otter trawls dragged along the bottom could impact the existing beds. Please consider using the trawls outside of the beds or using beach seines within the beds.	**Response 2:** Sampling gear and depth were discussed at the interagency meeting held 24 June 1997. It was agreed that otter trawls will be used only in the deeper portions of the Boat Channel, namely within the central channel. In the shallow, nearshore waters (especially near the eelgrass beds), beach seines will be deployed to capture fish for tissue analyses.

RESPONSE TO AGENCY COMMENTS ON DRAFT REMEDIAL INVESTIGATION WORK PLAN FOR THE BOAT CHANNEL, NAVAL TRAINING CENTER, SAN DIEGO CTO-0137

Comments from Gail C. Kobetich

Written on 18 July 1997
Received on 4 August 1997

Mr. Gail C. Kobetich
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U.S. Department of the Interior
Fish and Wildlife Service

GENERAL COMMENTS

The U.S. Fish and Wildlife Service (Service) offers the following comments for your consideration regarding the Draft Remedial Investigation Work Plan for the Boat Channel at the Naval Training Center (NTC) in San Diego, California. The Service's primary concern is the protection of public fish and wildlife resources and their habitats with an emphasis on federally listed threatened and endangered species. There is an existing California least tern *(Sterna antillarium browni)* [tern] nesting colony on NTC, and the Service is concerned with any contaminants that would affect the tern or its nesting habitat. A second major concern is the protection of water quality within the San Diego Bay (Bay) associated with activities and facilities proposed with reuse of the NTC property. Protection of Bay water quality is important because of tern and brown pelican *(Pelecanus occidentalis)* [pelican] foraging within the Boat Channel adjacent to NTC. Both the tern and the pelican are federally listed endangered species. The tern and pelican are totally dependent on marine fish that reside in Bay waters for food items. Existing contaminants on NTC need to be satisfactorily remediated by the Navy before the disposal of the NTC property occurs.

Response 1: Comment noted.

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A meeting was held recently held on 24 June 1997 to discuss the above mentioned document with the appropriate regulatory agencies. Unfortunately, Service staff were not available to attend due to illness and other scheduling constraints. However, we have received the minutes from that meeting dated 10 July 1997 which summarize the discussion and significant consensus which was reached on several issues. The Service supports most of the proposed changes in the Work Plan developed at the meeting; these changes address most of the Service's concerns regarding the document. The outstanding issues of concern to the Service are provided below with reference to the appropriate section and page in the document on which the subject is discussed.	
The Service would also like to address some of the issues discussed at the meeting based on the minutes provided by your office. The Service agrees with the approach agreed upon at the meeting for fish sampling and benthic community analysis. The suite and of fish species chosen is appropriate, and it would be helpful in future evaluations to sample the strata separately to the maximum extent feasible. Benthic invertebrate sampling is useful not only in clarifying chemistry and toxicity results, but the suite of species observed can be considered as to their relationship to stressed versus healthy conditions. Benthic community samples should be collected from the Boat Channel and reference sites. The use of the kingfisher to represent piscivorous species does not appear to be appropriate, and the Service encourages the Navy to consider a more extensive evaluation of the literature so that a more appropriate species (preferably a marine, piscivorous species) can be identified.	Comment noted. As discussed during the interagency meeting held 24 June 1997, sediments for benthic community analyses will be collected during the field investigation and archived. The need for benthic community analyses will be dependent on sediment toxicity and chemistry results and discussions with the regulatory agencies. The great blue heron, brown pelican, and least tern will be used as receptors for the ecological risk assessment in place of the belted kingfisher.

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SPECIFIC COMMENTS

Comment 1: Section 3.7.1.1 Sample Location, page 3-21: Some benthic organisms found in San Diego Bay burrow much deeper than six inches. A closer evaluation of the pathways is needed to evaluate specifically what organisms are being considered and whether sample collection to six inches adequately addresses exposure for these organisms. In a recent study conducted in support of remedial action at Convair Lagoon, ghost shrimp were found to burrow down as much as six feet into the sediments. The comment provided in the minutes that surface sediments were taken too deep in the previous study needs to be addressed in the context of pathways for contamination.	**Response 1:** It is acknowledged that some species of benthic invertebrates utilize deeper sediments for habitat. However, at stations where elevated contaminant levels were measured, these higher concentrations were found predominantly in the surface sediment, 0-1 foot below the channel bottom. At the midlevel sediment layer, which generally was between 1 and 4 to 5 feet below the channel bottom, contaminant concentrations dropped significantly. At the deepest core sections, no exceedances of screening levels were observed. Therefore, the most significant exposure pathway to benthic organisms is at the sediment surface, not at depth. This sampling effort is designed to be protective of all species through the use and testing of surrogate species considered to be sensitive to sediment contamination. By focusing efforts on these jointly selected sensitive species, it is believed that protection of the surrogates will also protect species that naturally occur in the test area.
Comment 2: Section 3.7.2.1 Sample Location, page 3-23: The wording needs to be clarified in the first full paragraph. The document currently states: "If the relative mean difference in mortality between the site test and bay sediment test is greater than 20% (or as appropriate for a given test) or if the difference is also statistically significant at the $p \leq 0.05$ level based on Student's t-test, then the study site will be considered significantly different than the bay background areas" (emphasis added). It is not clear from this if both criteria or just one will be required for a significant difference to be identified. The Service supports the use of an either/or criterion.	**Response 2:** A significant difference between a test station and a San Diego Bay background (reference) station will be identified if either criterion is satisfied.

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In this section conflicting bioassay results are also discussed. It is acceptable to defer decisions in these cases until further meetings with the resource agencies. However, it is important to consider the sensitivity of the test species in these discussions, as this frequently determines the apparent conflicts between test results. The entire suite of species tested needs to be considered comprehensively, rather than dismissing any results due to a perceived lack of sensitivity or over sensitivity of the chosen species.	The issue of species selection has been discussed at length with technical specialists experienced with marine sediment evaluations. The use of *Rhepoxynius* and *Strongylocentrotus* is based not only on their comparability to other studies conducted in San Diego Bay but also on their recognized sensitivity to sediment contamination. It is recognized that species sensitivity to a single chemical or suite of chemicals can vary between genera and between taxonomic groups, which is why more than one species is being tested and the combined results of both toxicity tests will be used at key decision points.
Comment 3: Section 6.3 Overview of the Risk Assessment Process, page 6-3: Cancer risk appears to drive remedial decisions under the Human Health Risk Assessment, but no clear criterion is given for what output of the Ecological Risk Assessment results in a "No Further Action Planned" status for the Boat Channel sediments.	**Response 3:** The results from an ecological risk assessment are much more difficult to interpret, and risk management decisions are not as straightforward as those associated with human-health risk assessments. No one measure dictates "further response action planned" or "no further response action planned." A "weight-of-evidence" approach will be taken where the results of the bioassays, sediment chemistry, fish tissue analyses, hazard calculations, and benthic community analyses (if conducted) will be evaluated as a whole. As we have seen in other projects, a clear-cut interpretation of analytical results and their biological significance is rare and unlikely, and criteria proposed to form the basis for a decision of "no further action" are not necessarily inviolate. Therefore, any risk-management decisions will be made only after data collection, analysis, interpretation, and discussion with regulatory agencies, whether the decision calls for "no further response action" or a Feasibility Study.
Comment 4: Section 6.3.1 Data Evaluation, page 6-4: The 95% upper confidence limit of the arithmetic mean will be used to evaluate sediment results. This is acceptable provided that there is not a great deal of variance in the reference results. High variance in the reference results can result in unrealistically high confidence limits that would not be acceptable to the Service. The approach provided in Appendix F of the document (Draft Risk Assessment Work Plan - page F3-16) appears to resolve this concern by using the maximum reference value in lieu of the upper confidence limit if the latter is higher and the sample number is low.	**Response 4:** Comment noted.

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Comment 5: Appendix F, Section 3.4.2 Nature and Extent of Contamination, page F3-4: Confirmatory site specific surveys of the aquatic habitats should be conducted if recent information is not available.	**Response 5:** Comment noted.
Comment 5: Appendix F, Section 3.7 Biological /Ecological Effects Assessment, page F3-17: Toxicity reference values (TRVs) are going to be obtained from Opresko et al. (1995). It is not clear from the discussion how closely related the species for which the TRVs were determined are to the species of concern in the Boat Channel. Please provide the service with a copy of this specific reference paper for our agency to review the TRVs cited in this study.	**Response 6:** The most recent available toxicity reference values (TRVs) will be used for calculations in the risk assessment. The reference cited in the Work Plan, Opresko et al. (1995), is currently available; however, this document is intended to be updated regularly by Oak Ridge National Laboratory as new findings become available. We will transmit a copy of the Opresko et al. reference directly to the Service. Another excellent way to obtain TRVs and other ecological benchmarks is on the Internet at: http://www.hsrd.ornl.gov/ecorisk/ecorisk.html.